

TECHNOLOGY AND CURRICULUM STANDARDS: HOW WELL DO INTERNET-BASED LEARNING GAMES SUPPORT COMMON CORE STANDARDS FOR MATHEMATICS?

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ABSTRACT

In an effort to keep up with the new generation of digital learners, educators are integrating multiple forms of technology into their teaching, including online learning game applications. The purpose of this study was to determine the degree to which internet-based learning game applications selected by preservice teachers were aligned with the Common Core Standards for Mathematics. Preservice teachers were trained using the SKATE Method and then chose online learning game apps that were easily accessible to school-age students. Using the Alignment Rating Scale, researchers determined how well the selected online learning game apps supported Common Core Standards for Mathematics. Findings indicated that only 66 percent of the online learning game apps supported the Common Core Standards for Mathematics, revealing a clear need for more curriculum alignment training for preservice teachers.

KEYWORDS

Learning game applications; mathematics curriculum alignment

1. INTRODUCTION

Curriculum alignment must be a central part in making instructional decisions in order to improve student success (McDonald and Van Der Horst, 2007; Squires, 2012). With the digital age upon us, more and more teachers are integrating technology into the classroom instruction, including the use of internet-based learning games. As a result, online learning game applications (apps) must be examined to determine how well they support classroom curriculum. This study served to identify the degree to which these apps reinforced Common Core Standards for Mathematics. Using the SKATE Method designed and developed by Jan Ray (Ray et al., 2011; Ray, 2006), preservice teachers identified, analyzed and selected internet-based learning game apps that were easily accessed by school-age children. The researchers then determined how many of these apps were actually in alignment with Common Core Standards for Mathematics.

2. THE STUDY

2.1 Background

Education majors enrolled in the teacher preparation program at the university, take teaching methods courses related to mathematics, language arts, science, and social studies. During the mathematics method course, preservice teachers were introduced to the Common Core Standards for Mathematics, as well as to the Texas Essential Knowledge and Skills (TEKS) for Mathematics—state developed standards that determine classroom curriculum and instruction (Texas Education Agency, 2011).

In order to keep up with the new generation of digital learners whom preservice teachers would soon be facing in the classroom, they were introduced to the SKATE Method for aligning internet-based learning game applications with mathematics standards. The SKATE Method provided a framework that enabled preservice teachers to provide their future students with instructionally-sound, internet-based educational games, learning activities, instructional videos, and other resources (online supporting curriculum) that aligned with the written curriculum (state and national standards).

The acronym SKATE represented the five steps preservice teachers took to successfully provide internet-based learning game applications for their future students. The structured steps were:

1. Start with **S**TANDARDS.
2. Find **K**ID-SAFE internet-based educational games, learning activities, instructional videos, and others resources that support standards-based instruction.
3. Check for curriculum **A**LIGNMENT.
4. **T**EST for quality instructional design.
5. Provide links to selected internet-based educational games, learning activities, instructional videos, and others resources for students through **E**DUBLOGs.

Special Note: Edublogs, a shortened term for educational blogs, first emerged in the field in 2001. Edublogs have been used in educational settings for communications, instructional resources, collaborative tools, and showcases for students' projects (Ray et al., 2011; Ray, 2006, pp. 175-177).

2.2 Purpose

This study focused on the degree to which online learning game applications reinforced and were in alignment with Common Core Standards in Mathematics. Preservice teachers were trained using the SKATE Method to identify, test, and create an edublog with links to selected internet-based learning game applications. These apps were then rated to determine how well they supported Common Core Standards for Mathematics concepts.

2.3 Research Question

One research question was developed for this study: How well are internet-based learning game applications (identified, tested, and delivered by preservice teachers using the SKATE Method) aligned with Common Core Mathematics Standards?

2.4 Participants

Participants in this study were 35 preservice teachers enrolled in a mathematics methods course at a regional university in Texas. Of the 35 students, 32 (91.43 percent) were female and 3 (8.57 percent) were male. Subject ages ranged from 20 to 43 years of age, with 27 years of age being the average. Twenty-five (71 percent) of the subjects were White. Seven (20 percent) of the students were Hispanic. Two subjects (6 percent) were Asian American and one (3 percent) student did not respond to the question regarding ethnicity.

2.5 Instrumentation

An Alignment Rating Scale was designed to measure how well technological applications (apps) reinforced the curriculum taught in the Common Core Standards for Mathematics. This rating scale used the following numerical values and criteria. A score of 2 indicated that the technological application “clearly practiced” a specific math skill in the Common Core Standards for Mathematics. A score of 1 indicated that the technological application “marginally practiced” a specific skill in the Common Core Standards for Mathematics. A score of 0 indicated that the technological application “did not support” a specific math skill in the Common Core Standards for Mathematics.

2.6 Procedure

Preservice teachers were introduced and guided through the SKATE Method for aligning the Common Core Standards for Mathematics with online learning game apps as follows:

1. S—Start with STANDARDS for Core Curriculum in Mathematics

Preservice teachers became familiar with the Common Core Standards for Mathematics in their mathematics methods course. The student learning objectives were discussed and demonstrated in class. Preservice teachers then demonstrated the math skill to each other in small groups. Methods students discussed what new insights they gleaned and discussed those areas of each math concept that may be problematic to school-age students.

2. K—Find KID-SAFE Online Learning Games

Next, methods students performed searches using key words related to the standards. Apps were tested to determine if they were safe for students. Apps with inappropriate, questionable, or offensive content were excluded. As the methods students analyzed apps they discarded those that were unsuitable for children.

3. A—Check for Curriculum ALIGNMENT

Apps were then analyzed to determine how well they aligned with the math curriculum. The preservice teachers documented each app and submitted them to the instructor for approval.

4. T—TEST for Sound Instructional Design

While previewing apps, preservice teachers quickly discovered that the online learning game applications varied greatly in their quality and degree of supporting quality standardized math curriculum. Participants played each app to determine if it was appropriate for use with school-age children and to what degree it supported or failed to support common core standards. Apps that displayed violence, or used negative responses to a student's wrong answer were eliminated.

5. E—Create an EDUBLOG to Effectively Communicate Ratings with Classmates

The simplicity of creating edublogs made it the perfect choice for effectively communicating app names and ratings among the preservice teachers and mathematics methods instructor. Using a free blog hosting site, preservice teachers were able to post links to the online learning game apps, along with the ratings each app received. Most preservice teachers were able to complete the entire task in less than two hours.

Preservice teachers used the technology they readily accessed. This included ipods, iphones, ipads, droid cell phones, computers (both Apple computers and pc's using Windows operating system). The Apple itunes store and Google Apps were the most commonly used for the methods students to locate and identify apps related to mathematics. Because these students will be certified to teach early childhood through sixth grade they tended to select apps for younger children. The math content most prevalent was whole number addition, subtraction, multiplication, and division. Most apps selected focused on fundamental elements of decimal numbers, counting coins, simple fraction concepts, and the number line. The apps were designed to reinforce mathematical concepts through repetition. The apps rated highest strongly supported the standardized math curriculum. The apps rated lowest minimally supported the Common Core Standards in Mathematics. Although the selected apps generally involved high interest activities, engaging readings, lively animation, motivational techniques, and frequent interaction, they were not rated on these criteria. This study focused on how well preservice teachers could identify internet-based learning games alignment with standardized math curriculum.

2.7 Data Analysis

The preservice teachers reported their apps in an edublog designed to communicate with all class members. All 175 apps were recorded into a common database with analysis. The Alignment Rating Scale was used by the instructor to evaluate the degree to which each app supported the common core mathematical standards.

2.8 Findings

The findings for the research question revealed that of the 175 online learning game applications identified by preservice teachers, 66 percent were rated 2 (“clearly practiced” a specific math skill in the Common Core Standards for Mathematics), 30 percent were rated 1 (“marginally practiced” a specific math skill in the Common Core Standards for Mathematics), and 4 percent were rated 0 (“did not support” a specific math skill in the Common Core Standards for Mathematics).

3. CONCLUSION

This study revealed that 66 percent of online learning game apps identified by preservice teachers “clearly practiced” a specific math skill in the Common Core Standards for Mathematics and 30 percent of online learning game apps “marginally practiced” a specific math skill in the Common Core Standards for Mathematics. These findings indicated that only two-thirds of the identified online learning game apps were in alignment with standardized math curriculum. From these findings, it may be concluded that preservice teachers need more experience aligning supporting curriculum, such as online learning games applications, to the written curriculum (Common Core Standards for Mathematics). The researchers have two recommendations. The first recommendation is to work with preservice teachers until they can align curriculum at a rate of 90 percent or greater. Because of the low percentage of alignment (66 percent) achieved by preservice teachers in the area of mathematics, the researchers recommend that this study be duplicated in other content areas, such as, English/Language Arts, Social Studies, and Science to determine the degree to which preservice teachers are able to successfully select online learning game apps that support standardized curriculum.

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